Application No.: 10/539,624

REMARKS

These amendments and remarks are filed in response to the Office Action mailed October 14, 2010. For the following reasons, this application should be allowed and the case passed to issue. No new matter or considerations are introduced by this amendment and this amendment clearly places the application in condition for allowance. Support for the amendment to claim 18 is found previously presented claim 21.

Claims 18-20 and 22-24 are pending in this application. Claims 18-24 were rejected. Claim 21 is canceled in this response. Claims 1-17 were previously canceled.

Interview Summary

Applicant greatly appreciates the courtesy of Examiner Han in granting a telephone interview with the undersigned on January 19, 2011. During the interview, the undersigned explained that the programmable controller was a distinct controller that further limited the fuel cell system, and not an intended use. The Examiner, however, believed the claimed controller would have been obvious. In addition, the undersigned also argued that claim 21 was separately patentable because the prior art did not specify the relative humidity of the gas when the fuel cell is not operating and a preferable humidity range for an operating fuel cell would not be suitable for a fuel cell that is not operating. The Examiner indicated that Applicant's arguments would be more persuasive if Applicant showed an unexpected result of the relative humidity range.

Claim Objections

Claim 18 was objected to because "freeing" should be --freezing--.

Claim 18 has been amended to correct this informality.

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Claim Rejections Under 35 U.S.C. § 103

Claims 18-23 were rejected under 35 U.S.C. §103(a) as being unpatentable over Mathias et al. (US 6,376,111) in view of Busenbender (US 2003/0039870) and Suzuki et al. (US 2001/0010872).

Claim 24 was rejected under 35 U.S.C. §103(a) as being unpatentable over Mathias et al., Busenbender, and Suzuki et al., and further in view of Ban et al. (US 6,350,536) and Gilbert (US 2003/0170506).

These rejections are traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the present invention, as claimed, and the cited prior art.

Claims 18-20 and 22-24 are allowable over the cited references. Mathias et al., Busenbender, and Suzuki et al., whether taken alone, or in combination, do not suggest a programmable controller programmed to: detect if either of the outside air temperature or a temperature of the fuel cells in a predetermined timing after the power generation is halted is in a predetermined temperature region which is set between a reference temperature below which freezing in the fuel cells is expected and a freezing point; and control the moisture-adjusted gas generating mechanism to supply a moisture-adjusted gas, a relative humidity of which is set within a range from 15 percent to 95 percent, to at least one of the anode and cathode, when the outside air temperature or the temperature of the fuel cells in the predetermined timing after the power generation is halted is in a predetermined temperature region, so as to remove surplus moisture in the fuel cells and maintain an appropriate wet condition of the fuel cells, as required by claim 18.

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Initially, it is noted that the controller further limits the claimed fuel cell system. The claimed controller is a programmable controller programmed to perform a number of functions. As the predecessor court to the Federal Circuit made clear, it is well settled law that a programmed controller is patentably distinct from an unprogrammed controller.

> [I]f a machine is programmed in a certain new and unobvious way, it is physically different from a machine without that program; its memory elements are differently arranged. The fact that these physical changes are invisible to the eye should not tempt us to conclude that the machine has not been changed. If a new machine has not been invented, certainly a "new and useful improvement" of the unprogrammed machine has been, and Congress has said in 35 U.S.C. § 101 that such improvements are statutory subject matter for a patent.
> *In re Bernhart*, 417 F.2d 1395, 1400 (C.C.P.A. 1969).

As is clear from the *Bernhart* decision, the programmable controller of the present claims is structurally distinct from the prior art controller, as its memory elements are differently arranged.

Mathias et al. teach detecting a resistance (humidity) of a fuel cell and controlling a humidifier **during operation of the fuel cells** such that the humidity of the fuel cell becomes equal to a target humidity which is predefined for increasing a generation efficiency of the fuel cells (col. 1:29-31 and col. 2:54-56).

Busenbender teaches that moisture remains in a fuel cell if a humidifier is applied during operation of fuel cells and may freeze after the operation of the fuel cells is halted (para. [0003]), and preventing freezing of the moisture in the fuel cells by mixing a chemical compound into the oxidant gas or the fuel gas (Abstract).

Suzuki et al. teach that moisture in fuel cells freeze when outside air temperature lowers after operating the fuel cells in a state where a humidifier is activated (para. [0012]), and introducing dry air into the humidifier to remove the residual moisture in the humidifier

(Abstract). Suzuki et al. also teach execution of this process after the operation of the fuel cells is halted.

As summarized above, the inventions according to Busenbender and Suzuki et al. are directed to a solution of a problem that is caused by the fuel cells operated under humidification by a humidifier. In view of these references, one of skill in the art would be lead to use a humidifier as disclosed in Mathias et al. during power generation by the fuel cells, and introduce a dry gas into the humidifier when the outside air temperature lowers including when the operation of the fuel cells is halted, thereby preventing the humidifier from freezing. Further, one of skill in this art may consider mixing a chemical compound into the oxidant gas or the fuel gas so as to prevent the fuel cells from freezing after the operation of the fuel cells is halted.

There is no suggestion or motivation in these references to apply the humidity control during the operation of the fuel cells taught by Mathias et al. after the operation of the fuel cells is halted. Because, the humidity control using a humidifier that is taught by Mathias et al. is performed for the purpose of increasing power generation efficiency during operation of fuel cells and power generation is not performed when the fuel cells are not operating, one skilled in this art would not be lead to apply humidity control using a humidifier taught by Mathias et al. to a situation after the operation of the fuel cells is halted.

The present claims are further distinguishable because the Mathias et al., Busenbender, and Suzuki et al. do not suggest controlling the moisture-adjusted gas generating mechanism to supply a moisture-adjusted gas, **a relative humidity of which is set within a range from 15 percent to 95 percent,** to at least one of the anode and cathode, when the outside air temperature or the temperature of the fuel cells in the predetermined timing after the power generation is

halted is in a predetermined temperature region, so as to remove surplus moisture in the fuel cells and maintain an appropriate wet condition of the fuel cells, as required by claim 18.

As disclosed in the present specification, the claimed range of 15% to 95% relative humidity is a critical range and provides unexpected results (see page 12, line 4 through page 13, line 20). As shown in Table-1, the fuel cell is capable of restarting at -20°C or lower if the relative humidity of reaction gas is within 15%-95%. If the relative humidity is lower than 15% or higher than 95%, it is not capable of restarting at -20°C or lower. Therefore, the claimed relative humidity range is critical to the operation of the claimed fuel cell system.

Ban et al. and Gilbert do not cure the deficiencies of Mathias, Busenbender, and Suzuki et al., as neither of Ban et al. nor Gilbert suggest the claimed programmable controller.

The dependent claims are allowable for at least the same reasons as claim 18 and further distinguish the claimed fuel cell system. For example, claim 20 requires that the programmable controller is further programmed to determine if the wet condition of the fuel cells is wetter than a predetermined wet condition or drier than the predetermined wet condition, control the moisture-adjusted gas generating mechanism to adjust a relative humidity of the moisture-adjusted gas to be wetter when the wet condition of the fuel cells is drier than the predetermined wet condition, control the moisture-adjusted gas generating mechanism to adjust the relative humidity of the moisture-adjusted gas to be drier when the wet condition of the fuel cells is wetter than the predetermined wet condition, and control the moisture-adjusted gas generating mechanism to stop supplying the moisture-adjusted gas when the wet condition of the fuel cells is equal to the predetermined wet condition. The cited references do not suggest a fuel cell system with a programmable controller with these additional limitations.

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In view of the above amendments and remarks, Applicants submit that this amendment should be entered, the application allowed, and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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